

FAA Fire Safety R&D Program: Past, Present and Future

Constantine Sarkos Richard Hill

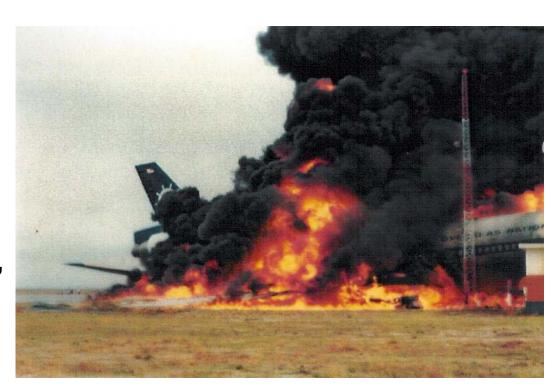
Fire Safety Branch
FAA William J. Hughes Technical Center
Atlantic City Airport, NJ 08405
U.S.A.

The Fourth Triennial International Fire and Cabin Safety Research Conference
Lisbon, Portugal
November 15 – 18, 2004

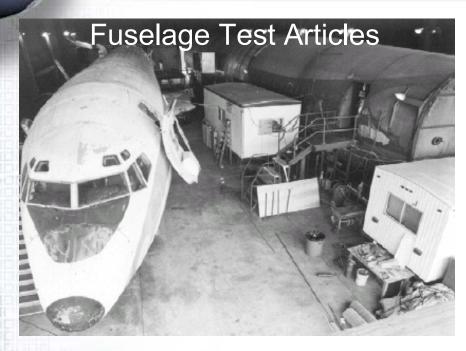


Past FAA Fire Safety R&D

- Main Focus on Improved Postcrash Fire Survivability
- Improved Fire Test
 Criteria for Interior
 Materials
 - Concern with Flammability,
 Smoke and Toxicity
- Importance of Full-Scale Fire Tests
- Major Cabin Water Spray Program



Full-Scale Fire Test Facility



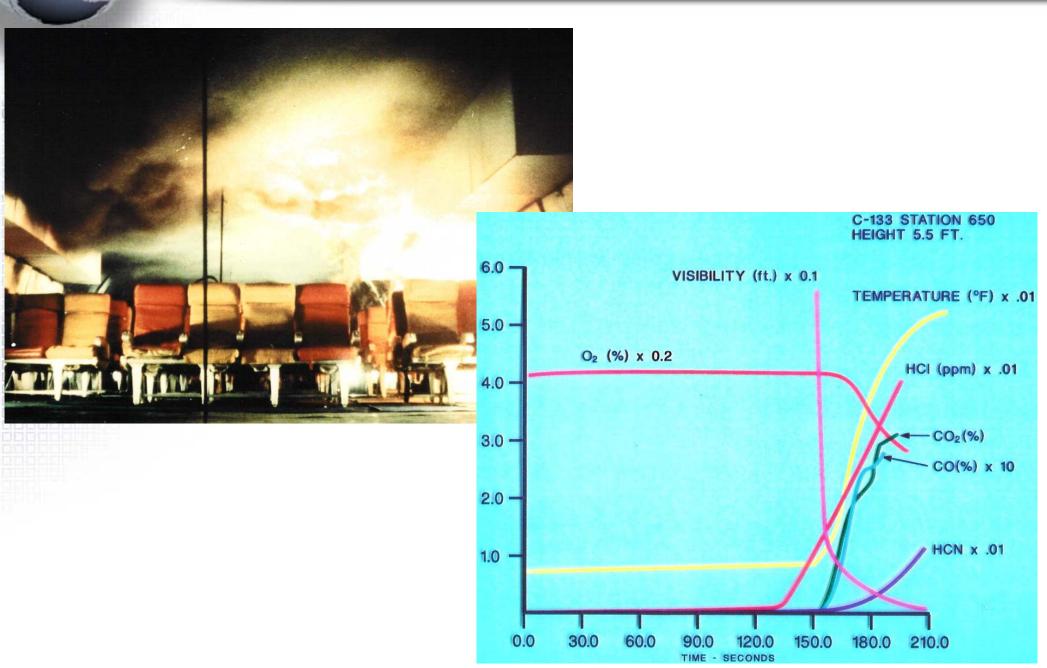






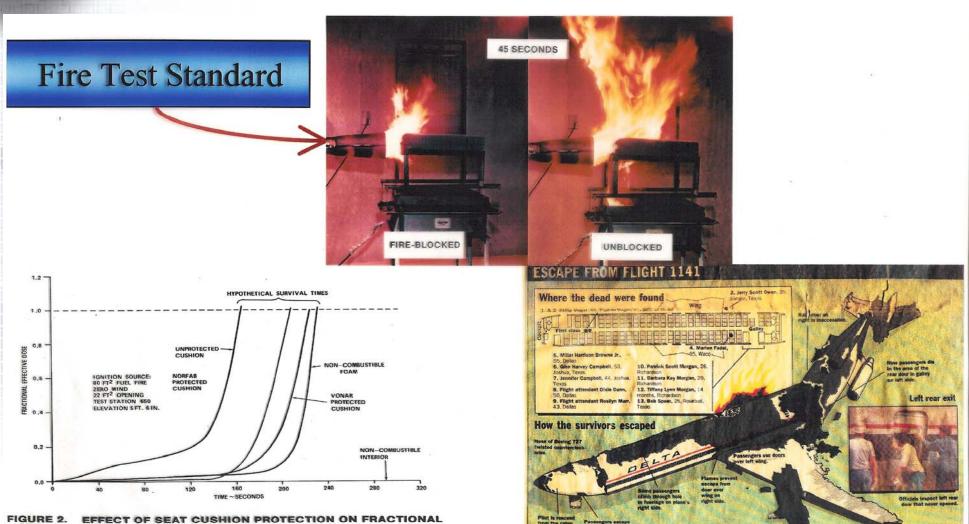
Full-Scale Fire Test Results

(Importance of Flashover)





Seat Fire Blocking Layer Effectiveness



EFFECTIVE DOSE

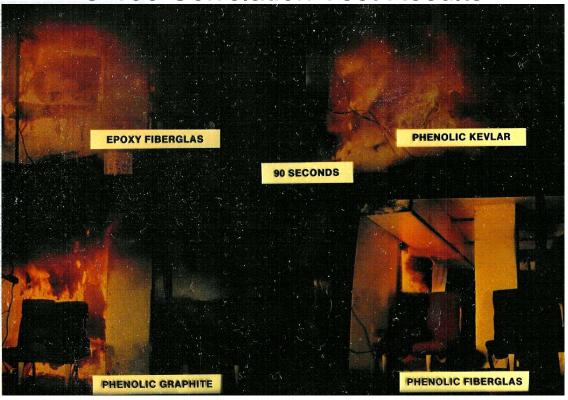
Full-Scale Test Benefit

Accident Benefit

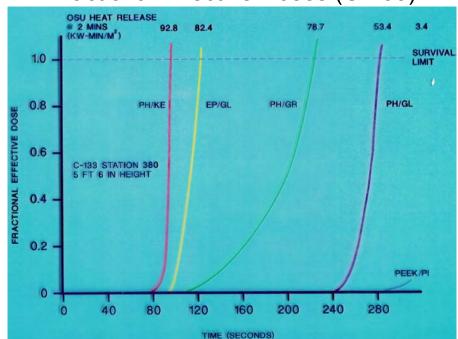


Low Heat Release Panel Effectiveness

C-133 Correlation Test Results

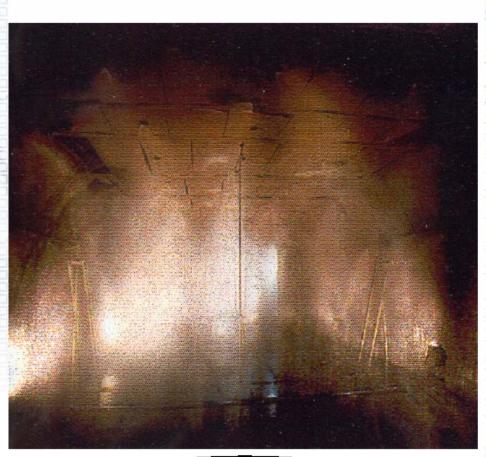


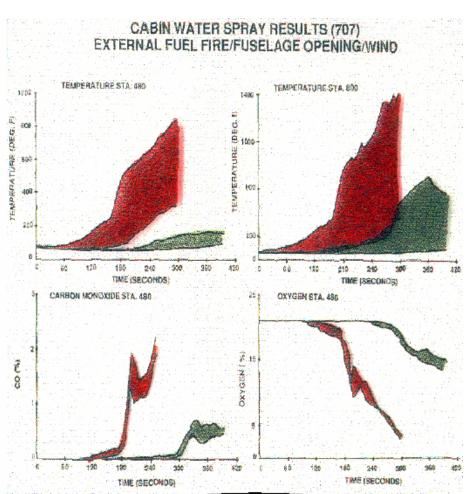
Effect of Composite Panel Design on Fractional Effective Doses (C-133)





Cabin Water Spray Effectiveness





On-Board Spray System Discharge

FAA Fire Test Data



Past R&D Regulatory Products

- Seat Cushion Fire Blocking Layers
- Low Heat/Smoke Release Panels
- Floor Proximity Lighting
- Heat Resistant Evacuation Slides
- Fire Resistant Flight Data/Voice Recorders
- Burnthrough Resistant Cargo Liners
- Halon 1211 Extinguishers
- "Combi" Fire Protection



Current FAA Fire Safety R&D

- Main Focus on Hidden In-Flight Fires and Fuel Tank Explosions
- Drivers:
 - Accidents
 - Incidents
 - NTSB and TSBRecommendations
 - Ban on Halon Production
 - Cargo Detector FalseAlarms
 - Aviation Safety Research
 Act of 1988

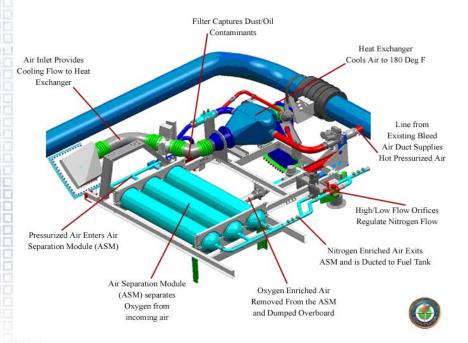


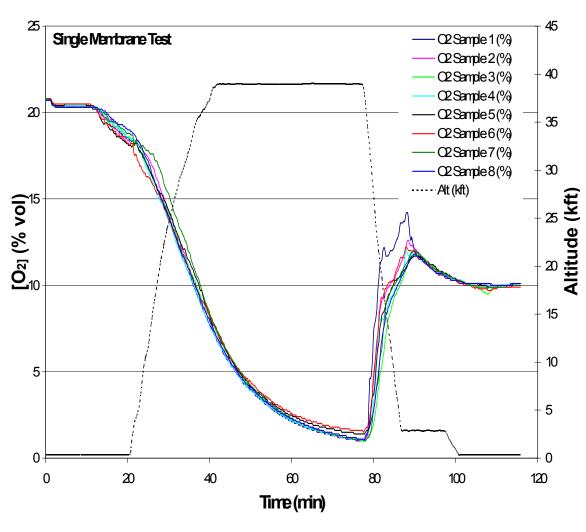




Fuel Tank Inerting

Schematic of On-Board Inert Gas Generation System (OBIGGS)







Fuel Tank Flammability

Inerting Requirements

➢ Ignition tests conducted at the FAA to determine the Limiting Oxygen Content (LOC)

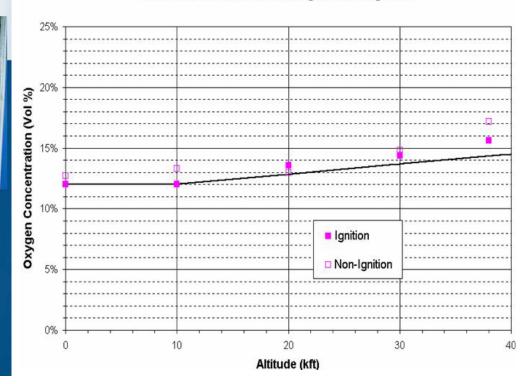




Controlled parameters:

- Pressure (altitude)
- Fuel temperature/flammability
- Oxygen concentration
- Ignition source

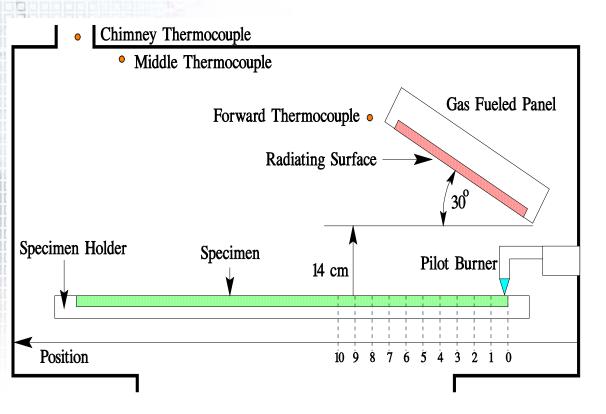
Minimum/Maximum Values for Ignition/Non-Ignition



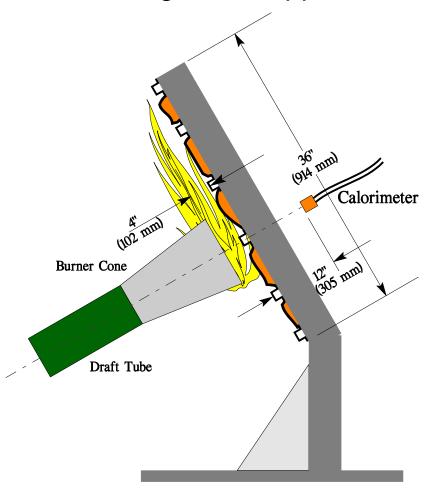


Thermal Acoustic Insulation Flammability

Schematic of Radiant Panel Test Apparatus



Burnthrough Test Apparatus





Hidden Fire Protection

Fire Resistant Materials



Fire Extinguishment





Halon Replacement



Lavatory



Cargo Compartment



Hand-held Extinguishers



Engine Nacelle



Cargo Fire Detection

DOT/FAA/AR-03/34

Office of Aviation Research Washington, D.C. 20591 Comparison of Actual and Simulated Smoke for the Certification of Smoke Detectors in Aircraft Cargo Compartments

November 2003

Final Report

This document is available to the U.S. public through the National Technical Information Service (NTIS), Springfield, Virginia 22161.



U.S. Department of Transportation Federal Aviation Administration DOT/FAA/AR-03/49

Office of Aviation Research Washington, D.C. 20591 Computational Fluid Dynamics
Code for Smoke Transport During
an Aircraft Cargo Compartment
Fire: Transport Solver, Graphical
User Interface, and Preliminary
Baseline Validation

October 2003

Final Report

This document is available to the U.S. public through the National Technical Information Service (NTIS), Springfield, Virginia 22161.

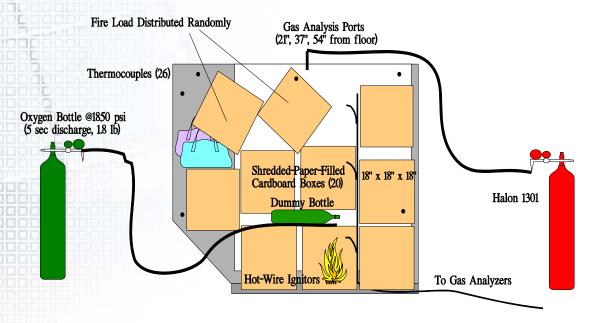


U.S. Department of Transportation Federal Aviation Administration

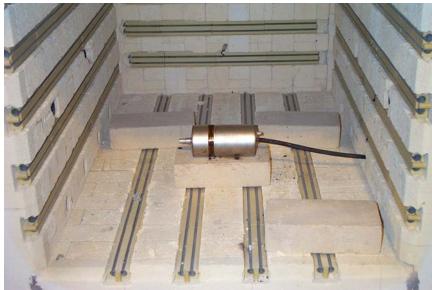


Oxygen Cylinder/Generator Protection

Oxygen-Fed Fire Test



Oven Test on Generator

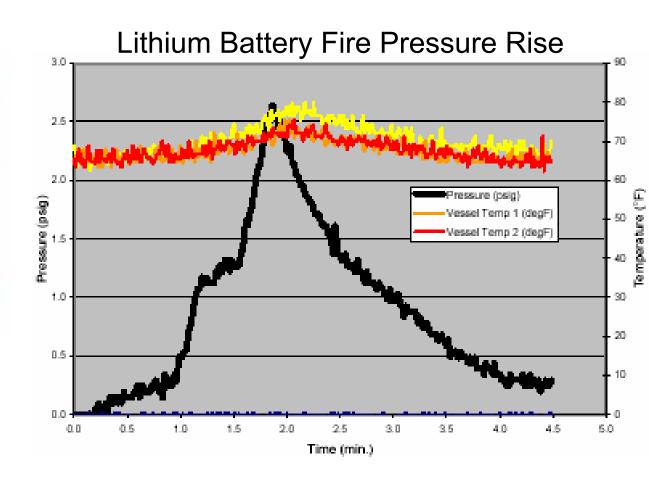




Lithium Battery Cargo Fire Hazards

Primary Lithium Batteries







Aircraft Accident Investigation

Thai International 737 March 3, 2001; Bangkok



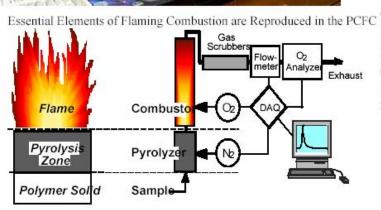
China Northern DC-9 May 2, 2002; Dalian, China





Ultra-Fire Resistant Materials

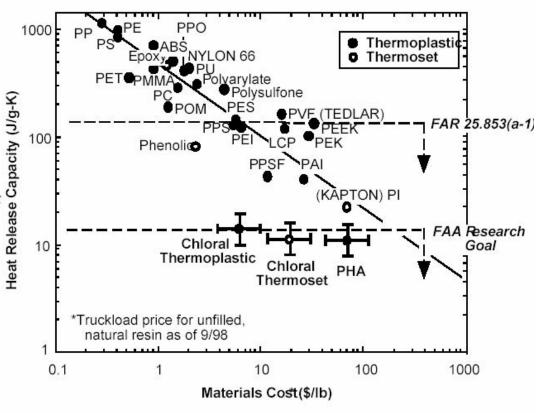
Pyrolysis-Combustion Flow Calorimeter



Flaming Combustion Pyrolysis-Combustion Flow Calorimetry

Supporting Sciences

MATERIALS COST AND FIRE SAFETY



Advanced Polymers



Future FAA Fire Safety R&D

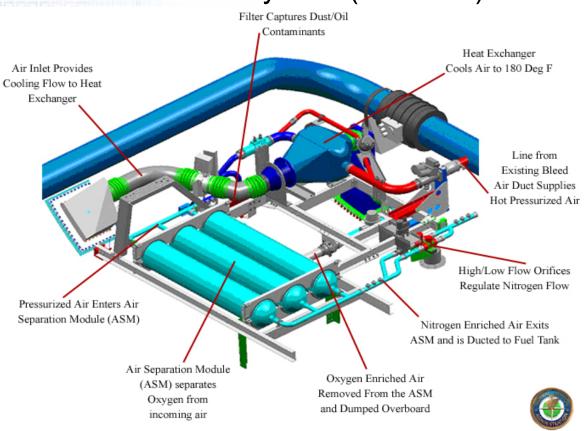






Fuel Tank Inerting Implementation

Schematic of On-Board Inert Gas Generation System (OBIGGS)



OBIGGS Installed in 747





Fuel Tank Flammability

NASA 747 Shuttle Carrying Aircraft



NASA Dryden Flight Research Center Photo Collection http://www.dfrc.nasa.gov/gallery/photo/index.html NASA Photo: EC98-44740-4 Date: September 1998 Photo by: Carla Thomas

Shuttle Atlantis Returning to Kennedy Space Center after 10 Month Refurbishment

FAA 0₂ & Total Hydrocarbon Instrumentation





Hidden Fire Safety







Air Tran DC-9, 8/8/00

American MD-80, 11/29/00

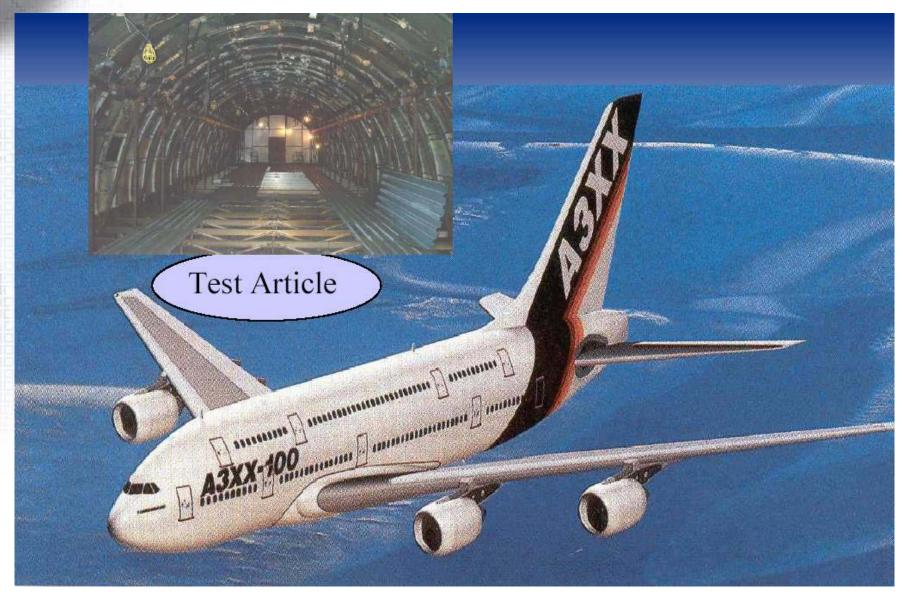


Composite Aircraft Fire Safety





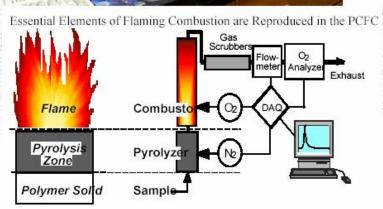
Very Large Transport Aircraft (VLTA) Fire Safety





Ultra Fire Resistant Materials

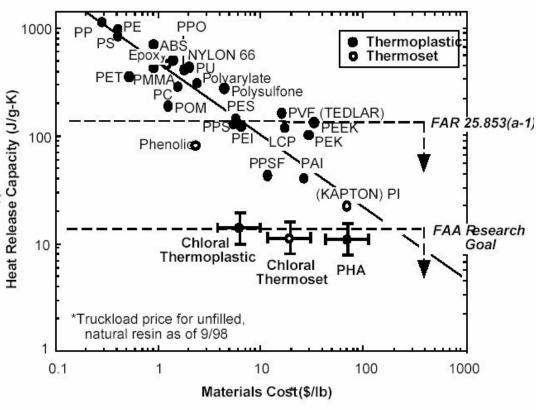
Pyrolyala-Combustion Flow Callorimater



Flaming Combustion Pyrolysis-Combustion Flow Calorimetry

Supporting Sciences

MATERIALS COST AND FIRE SAFETY



Advanced Polymers



International Material Fire Tests & Systems Working Groups

www.fire.tc.faa.gov



FAA Home Site Map DOT Ask FAA FAA Search

Fire Safety Branch Reports | Handbook | Conference | Information | Search | Tech Center

Groups

Fire & Cabin Safety Materials

Fire Research

What's New

Date	Section	Description
7/22/04	Materials	Added presentations, minutes and attendee list from the July meeting.
7/19/04	Systems: Fuel Tank Protection: Downloads	Updated Fuel Air Ratio Calculator.
7/15/04	Systems	Added PDF versions for larger presentations from the June meeting.
7/13/04	Systems: Fuel Tank Protection: Fuel Tank Flammability	Updated the Flammability Section
7/12/04	Systems	Added presentations, minutes and attendee list from the June meeting.
7/9/04	Reports	Added report DOT/FAA/AR-04/26.
7/8/04	Reports	Added report DOT/FAA/AR-03/58.
7/8/04	Systems: Fuel Tank Protection: Fuel Tank Inerting	Updated the Inerting Section
6/29/04	Reports	Added report DOT/FAA/TN-04/21.
6/3/04	Handbook	Updated Appendix G
5/24/04	Materials	Agenda for July meeting posted.
5/24/04	Reports	Added report DOT/FAA/AR-TN04/4.
5/13/04	Systems	Agenda for June meeting posted.
5/4/04	Systems: Fuel Tank Protection - Presentations	Added new presentation.
4/26/04	Materials	Fixed registration link; now points to correct file.
4/26/04	Reports	Added report DOT/FAA/AR-04/1.
4/19/04	Materials	Attendee list from March meeting posted.
4/7/04	Materials	Added July meeting info and registration form.
3/24/04	Materials: Burnthrough	Added minutes from the Task Group Meeting
3/24/04	Handbook	Updated Appendix G
3/22/04	Materials	July meeting dates and location posted.
3/22/04	Systems	Updated the Systems Fire Group page. June meeting info and registration form are also posted.
3/10/04	Materials	Added presentations & minutes from March meeting.
3/3/04	Systems: Fuel Tank Protection: Downloads	Updated link for Fuel Tank Inerting Model, Open use version 1b
2/9/04	Reports	Added report DOT/FAA/AR-95/49.
2/4/04	V:=14	All Non-U.S. citizens who wish to visit the William J. Hughes
	A COMMON TO A COMM	1

Just Released

Final Rule:

Improved Flammability Standards for Thermal/Acoustic Insulation Materials Used in Transport Category Airplanes

Click here for the PDF file.

New Announcements

The Fourth Triennial International Fire & Cabin Safety Research Conference will be held November 15-18, 2004, in Lisbon, Portugal. Click here for information.

Conference Program Now Available

Highlights



1997 Highlights 1998 Highlights 1999 Highlights

This site is viewed best at a screen resolution of 800x600 or higher using the latest 4.0+ broswers. Click the links to the right to download the latest broswers.







